Abstract

With growing interest in mobile ad-hoc networks and increasing storage, processing power, and mobile device connectivity, the use of database technology for mobile devices becomes important, but requires new solutions for problems like message loss, unpredictable disconnections of mobile devices, and network partitioning. When applying database technology in such mobile environments that was designed for traditional fixed-wired networks, the problem of resource blocking, transaction blocking, and protocol blocking arises. To avoid these kinds of blocking, synchronization strategies have been developed that reduce the overall goals "atomicity" and "full serializability", but take data inconsistencies into account.

In this thesis, we strike a new path to reduce resource blocking, transaction blocking, and protocol blocking for distributed transactions in mobile ad-hoc networks without abandoning the goals "atomicity" and "full serializability". We present three main contributions: The Adjourn State, which prevents transaction blocking before the atomic commit protocol starts, and the Cross Layer Commit Protocol and Bi-State-Termination, both of which reduce blocking during the execution of the atomic commit protocol. These results allow us to give full transactional guarantees such as atomicity, serializability, and data consistency within mobile ad-hoc networks.

Bibliography